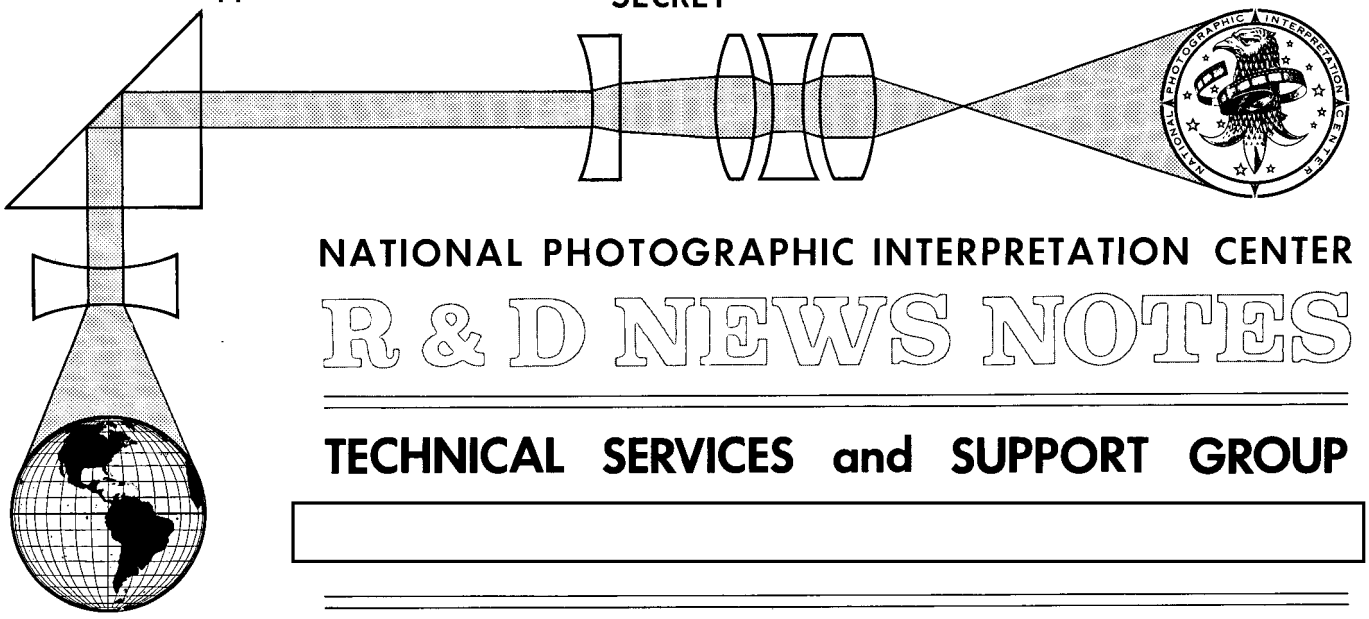


NATIONAL PHOTOGRAPHIC INTERPRETATION CENTER

R & D NEWS NOTES

TECHNICAL SERVICES and SUPPORT GROUP

25X

Vol. 1, No. 5 June, 1968

The following items have been taken from R&D progress reports of the Technical Services and Support Group and are being distributed because of their general interest. We would like to know what questions or problems you have concerning the items reported in this edition. Your comments concerning related R&D topics will also be appreciated. A form is attached that will make it more convenient for you to submit your comments. An effort will be made to answer them either personally or in future R&D News Notes.

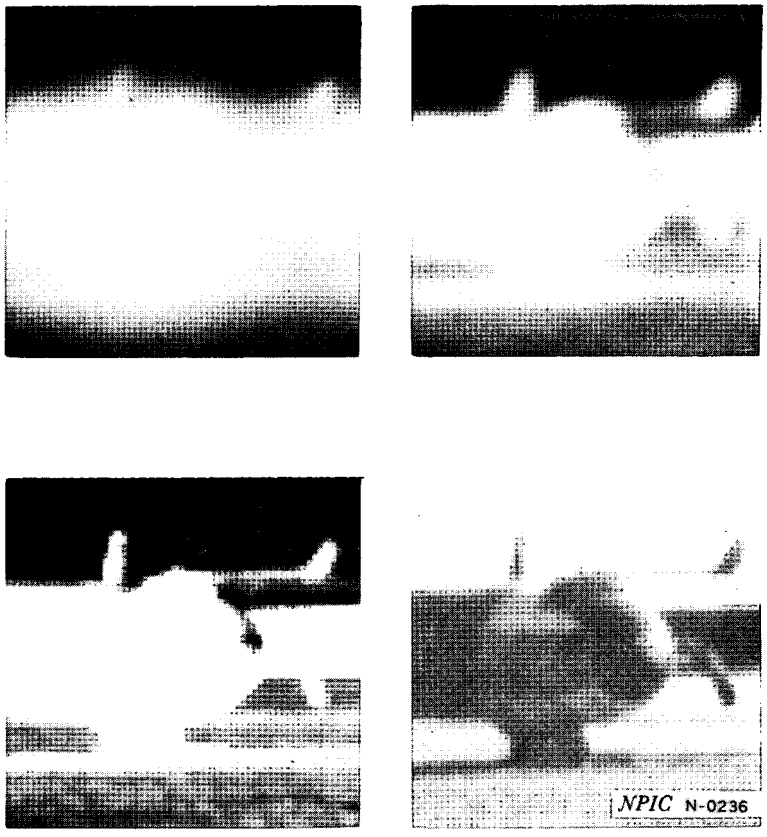
Mensuration Instrument for PIs

An instrument now under development will bridge the gap between high precision equipment used by the photogrammetrist and the scales and tube magnifiers used by the photo interpreter. The Twin Stage On Line PI Comparator under contract with the [redacted] will allow the PI to quickly make relatively accurate measurements. 25X The one year contract requires the design and fabrication of a compact, light weight device that will utilize modified [redacted] High Power optics. X1 The equipment will be about 34 by 48 inches in size and is intended to be used in the PI work area. It is to have two 6-inch square viewing stages to accommodate large scale photography for film chips. The PI will be able to perform measurements in stereo. The stereo images need not have the same scale since the instrument will be equipped with a differential magnification capability and a variable differential drive to compensate for different scales. The Comparator will be on line with NPIC's Univac 494 computer and will have an accuracy of two microns over a one inch area. Hopefully, the Comparator will allow the PI to fulfill the majority of his mensuration needs himself and allow the photogrammetrist to concentrate on the highest quality requirements. The Project Officer on this equipment is [redacted] Room 5S-453B). X1 The work is classified [redacted] X1

News Images From Old

One of the most spectacular and potentially rewarding developments in photography has reached a new milestone. An advanced computer processing technique called Digital Image Restoration has demonstrated that it can extract recognizable imagery from extremely degraded photographs. The blurred photograph shown below is typical of low quality or degraded imagery acquired in the presence of atmospheric disturbances (smog or haze), camera malfunction or film graininess. The Exploratory Laboratory, working with its contractor, [redacted] processed the image as shown in the succeeding photograph. Briefly, this is how Digital Image Restoration works. 25X

Using a light-sensitive electronic detector, darkness values are read from small areas of degraded film. Values are obtained in the form of a mosaic of 64 x 64 tiny squares. The darkness value for each tiny square depends upon the density or degree of imagery darkness originally recorded.



DEFOCUSED B-36

PARTIALLY RESTORED IMAGE

RESTORED NEGATIVE IMAGE

POSITIVE OF RESTORED NEGATIVE IMAGE

Darkness values are electronically translated into a form that is understood by an IBM 1800 computer and presented to it. The computer is instructed to produce preliminary data on the scene. From this data the scientist estimates the amount of detail in the scene, and he directs the computer to apply one of a series of correction operations to the darkness values. This essentially minimizes the effects of degrading factors. Finally, the computer is directed to present the "clear" imagery on Polaroid film in the original 64 x 64 mosaic form, each mosaic element 1/32" x 1/32" in size.

The current program phase was intended to demonstrate feasibility. This accomplished, the Laboratory plans a continuous effort to yield a practical system. It ultimately envisions hardware which will serve as a new PI tool for exploiting degraded imagery of the future.

The Project Monitor is [redacted] 25X1 [redacted]

Scarcity of Silver Prompts New Research

Silver has become an increasingly important commodity in our economy. Industrial consumption in 1964 was 127 million ounces, 31 percent of which was used by the photographic industry. However, the extreme scarcity of this valuable metal has doubled its price in the past two years. It is now valued at $2.40 per troy ounce while U.S. production is only 25 percent of industrial requirements. In an effort to conserve silver, NPIC has been examining several approaches to develop non-silver photographic materials. One of these approaches involves a relatively new science (about 6 years old), known as Light Excited Chemistry. [redacted] X1 a firm with 20 years experience in non-silver materials, has been exploring this new science in the development of Free-Radical materials. This new material requires exposure by a specific wavelength usually in the blue to green region of the light spectrum, and development by another wavelength in the red region. The free radical molecule is changed to a dye by the absorption of the light during exposure. The dye causes the same change to its neighboring molecules during the development cycle. Fixing of the process is achieved by applying heat. A study by [redacted] 25X Room 5S 453H) contains a brief explanation of the new science, compares the Free-Radical materials with silver and other materials, and evaluates the work done by [redacted] X1 This article is [redacted] 25X

Learning More About Anamorphic Eyepieces

A recent report written by [redacted] Room 5S 453B) 25X describes in detail a method for obtaining optimum stereo fusion using the [redacted] X1 Compact Variable Anamorphic Eyepieces. The report, classified SECRET, is entitled Procedures for Setting up Anamorphic Eyepieces and is dated 25 January 1968. While the report was widely distributed shortly after its publication, you may have inadvertently missed this valuable information. Additional copies can be obtained from the Development & Engineering Division of TSSG. [redacted] 25X

Understanding R&D

In response to questions concerning research and development, this issue and future issues will contain brief articles covering the nature of R&D or concerning some of the terms often used in modern technical writings. The subject of this issue is a discussion of the sequence of events occurring prior to actual development work.

Before the development of new equipment can begin, four prerequisites must be accomplished. First, the need for the equipment must be recognized and defined. Present equipment may be inadequate because it is too slow, does not produce accurate or sufficient output, is not adequate for an oncoming collection system, is uneconomical to use, or for other reasons. Once the need is defined, the market must be examined to determine if "off-the-shelf", or previously developed, commercially available equipment will meet the need. If such equipment can be purchased then there is no need for a development. The non-existence of adequate equipment logically leads to the third prerequisite; the matching of the need with the state-of-the-art. In other words, we must review recent research and development in those fields of science and engineering related to the defined needs to determine how close they come to solving the problem. This is done by consulting with industrial and governmental R&D organizations, by reading technical journals and by performing patent searches.

The three prerequisites may not be accomplished in the exact sequence just described. Occasionally, a review of the state-of-the-art may reveal a new process or piece of equipment that leads to the realization that present procedures or equipment can be improved considerably with some additional development. This reviewing process usually discloses those organizations (companies, laboratories, universities, etc.) that have done work in the area of interest and may be prospective contractors for the development.

After these three prerequisites have been satisfactorily accomplished administrative approval must be obtained and funds allocated for the work. The higher the cost of the proposed project, the higher the authorization required for its approval. [redacted] 25X

(Classification)

R&D NEWS NOTES

(Date)

TO: Editor, R&D NEWS NOTES, TSSG/DED

FROM:

I would like to offer my comments/questions concerning some of the following items.

a. Mensuration Instrument for PI's

b. New Images From Old

c. Scarcity of Silver Prompts New Research

d. Learning More About Anamorphic Eyepieces

e. Understanding R&D

(Classification)